REVIEW

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EINFÜHRUNG IN DIE THEORETSCHE PHYSIK,

Bd. III Teil 2. (1951)—By Cl. Schaefer, publisher—Walter de Gruyter & Co., Berlin. Pp. vii + 510, Price DM 40

The book under review is very well-known throughout the world as a standard text book on the subject of the quantum theory and wave mechanics. Of this book, first five chapters deal with the ideas and the applications of quantum theory to atomic phenomena, the next four discuss among others, the same problems from the point of view of the non-relativistic wave mechanics and the last one is devoted to the relativistic wave mechanics—the Dirac electron theory. Usually in a book which covers such a wide field, selection of topics and relative length of exposition required to present each of them without obscurity is an exceedingly difficult task. It is here that the author has shown his remarkable skill. The subject matter beginning with Planck's radiation theory and ending up with the Dirac electron theory has been gradually and continuously built up, and appropriate experimental findings have been quoted to show how closely the theoretical formulae agree with them.

The introductory remarks deal with the significance of the Planck's radiation formula which is the starting point of quantum theory. Chapter I describes the Compton scattering of light by electron to show the corpuscular nature of electromagnetic radiation. Chapter II discusses the mathematical tools of the quantum theory and outlines the application to the Bohr-Rutherford model of the atom. Chapters III, IV and V deal with the elaboration of different quantum numbers in connection with Kepler problem together with the relativistic generalisation due to Sommerfeld, the characteristics of alkali spectra, Zeeman and Paschen-Back effect, the periodic classification and the Rontgen spectra. Chapter VI introduces wave mechanics from Hamilton's principle, and the applications of the Schrödinger equation to Kepler problem; oscillator and rotator cases are worked out in details in chapter VII which also includes both the theory and application of the perturbation theory (time-independent). Chapter VIII is devoted to the statistical interpretation of wave mechanics and the connection between statistical mechanics and wave mechanics is shown. Also a section deals with Heisenberg's matrix mechanics. Chapter IX discusses the wave mechanical interaction between electromagnetic radiation and charged particles. After giving a few definitions such as charge-current-density matrices and the dipole moments, the perturbation theory (time-dependent) is developed and applied to transition probabilities. The theory of dispersion and Raman-effect is also included in two sections of this chapter. Chapter X gives an account of the Dirac theory of electron and explains the solution of the equation for a free particle and for a particle subjected to electromagnetic field. The magnetic moment of the Dirac electron and the fine structure of the energy levels of the hydrogen atom have been fully worked out. Finally, a passing reference is made to the negative energy states and the theory of positrons.

In view of the considerable importance that has gathered round Tomonaga-Schwinger formalism of relativistic quantum electro-dynamics, one would have wished a short final chapter on the quantization of wave fields to make the book complete and up-to-date. There is no doubt that the present book, though in German language, will continue to prove itself extremely helpful to students doing final degree course and researches at the early stage.

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